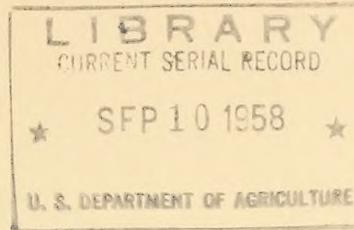


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FEDERAL-GRANT RESEARCH

at the
STATE AGRICULTURAL
EXPERIMENT STATIONS

Projects on
ENTOMOLOGY AND
ECONOMIC ZOOLOGY
Part 7, Section B

Agricultural Research Service
UNITED STATES DEPARTMENT OF AGRICULTURE

Compiled May 1958 by

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D. C., for use of workers in agricultural
research in the subject-matter areas
presented. For information on specific
research projects write to the Director
of the Station where the research is being
conducted.

Issued June 1958

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Section B: Fruit, Nut, and Vegetable Insects

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INTRODUCTION

This compilation is one of a series providing information on State agricultural experiment station research supported by Federal-grant funds appropriated annually by Congress under authorization of the Hatch Act of 1887, as amended and approved Aug. 11, 1955, and Section 204(b) of the Agricultural Marketing Act of 1946. It is prepared for use by research workers in the subject-matter areas presented. Only that part of each State's research program supported by Federal-grant moneys is included.

In addition to the Federal-grant moneys, the State experiment stations receive some Federal support through cooperative agreements or contracts with the U. S. Department of Agriculture. Information on such research, along with other departmental research, is available in the Central Project Office, Agricultural Research Service.

A substantial part of each State agricultural experiment station's research is supported with moneys appropriated by the respective State or Territorial Legislatures and through other forms of private and public financing. Information on current agricultural research at the stations which is not financed under the Federal-grant program or through USDA cooperation can be obtained from experiment station directors.

The information given in the series of Federal-grant compilations includes the title and objectives of each Federal-grant project pertaining to the subject given on the cover. The identification of each project gives the department(s) conducting the research, the station number of the project, and the number of the regional project if it is a contributing project.

Relevant regional projects, if any, appear at the end of the compilation. States having projects contributing to regional projects are indicated. The Roman numeral (and capital letter) refer to the location in the summary of the contributing project title and objectives. The States are grouped into four major regions. These are designated NC-North Central, NE-Northeastern, S-Southern, and W-Western. The capital letter "M" following the letters for the region indicates regional marketing projects.

I. FRUIT INSECTS

A. General

La.

Production, Breeding and Handling of Tree and Small Fruits with Particular Reference to Figs, Pears and Miscellaneous Fruits. To assemble and evaluate existing varieties in Louisiana; improve these varieties through breeding and test them on various markets for fresh and processed fruits.

Hort., Food Technol. 822 Coop. ARS

Maine

Biology and Control of the Codling Moth in Maine. To (1) produce more thorough knowledge of biology of codling moth under special environmental conditions in Maine, determining why the pest is increasing in some orchards but not in others, and finding details of seasonal cycles; and (2) study the efficiency of control practices including insecticides, cleanup and orchard sanitation, and biological control.

Ent. 49

Minn.

Fruit Insect Pests. To (1) determine role of insects and mites in increasing number of crop failures that are being reported by strawberry growers; (2) select insecticides and an adequate spray schedule for control of insect pests of such small fruits as strawberries, raspberries and currants; (3) test new materials that may fit into the tree fruit spray schedules; (4) determine annually the nature and amount of damage that has occurred in Minnesota fruit plantings.

Hort., Pl. Path. 1728

N. J.

A Study of the Post-Harvest Improvement of the Marketable Quality of Fresh and Processed Food. To (1) prevent fruit fly infestations developing on harvested crops such as tomato, pepper, peach, etc. from the time they leave the farm until processed or sold at retail; (2) remove dead bodies of insects adhering to vegetables and which have been killed by insect parasites and entomophagous fungi; (3) study pest problems of roadside fruit and vegetable stands including wasps and bees which puncture skin of fruit, beetles as pests of ripe fruits, solution of the problem if insects attracted to stands at night by their lights, etc.; (4) prevent decay and contamination of harvested, perishable food caused by fungi or bacteria until products preserved or consumed; and (5) determine effect of the treatments for decay and disinfection on the quality of the products so treated.

Ent., Chem., Food Technol., Pl. Path. ES 317 Coop. ARS

N. Y.
(State)

Establishing a Plant Introduction Station and Maintaining Germ Plasm Plantings for Horticultural Materials at Geneva, New York. To (1) establish and maintain a primary regional plant introduction station with adequate facilities and personnel to handle introduced and domestic plant materials of potential value to the region; (2) cooperate with other states in the region, ARS, and with other regions in a coordinated program to discover their value for plant improvement; and (3) maintain and preserve valuable germ plasm of horticultural plants of economic value to the region, including strains or varieties resistant to cold, disease and insect pests, and stocks used in propagation of varieties.

New Crops 17 (NE-9)

N. C.

Biology, Ecology and Control of Insects Affecting Peaches and Apples. To determine (1) prevalence and importance of various insects affecting peaches and apples in North Carolina; (2) life history, habits and biology; (3) ecology of peach and apple insects; (4) relationship of parasites and predators to abundance of insects; (5) effect of insecticides on the tree, fruit, parasites, predators, pollinating insects and injurious insects; and (6) better methods of control.

Ent. 42

Wis.

The Quality of Fresh and Processed Fruit as Affected by Orchard Sprays. To (1) determine effects of spray chemicals used in apple and cherry orchards on color, finish, texture, firmness, taste, and storage life of fresh and processed fruit, and (2) relate findings to preferences or needs of consumers and processors.

D and F, Ent.. Pl. Path. 952

B. Apple and Pear Insects

Colo.

Influence of Orchard Management Practices on Insect and Mite Populations of Some Fruits. (1) Maintain low orchard populations of mite pests through selective insecticidal rotations to combat build-up of resistance. Study (2) beneficial species involved in reduction of populations and select insecticides least harmful to species; (3) various types of insecticide rotation to learn which is most efficient; (4) environmental and cultural factors promoting populations of beneficial species.

Ent. 37

Conn.

Control of Orchard Insects with Concentrated Sprays.

Learn (1) efficiency of concentrated sprays applied by a mist blower in controlling mites, apple maggots, and other important pests of apples; (2) effect of concentrated sprays on fruit and foliage.

Ent. 318

Del.

New Insecticides for Fruit. To improve control of destructive orchard pests in state, without impairing finish of fruit or introducing residue hazards.

Ent., Hort. 4-E

Ind.

Development of Practical Methods for Control of Insects and Mites Attacking Apples. To develop practical methods for control of mites and insects attacking apples.

Ent. 663 Coop. ARS

Maine

Control of the Apple Maggot. To learn (1) insecticide or insecticide combination most effective in control of apple maggot in state; (2) effect materials have on fruit finish; (3) effect materials have on mite, predator-parasite complex; (4) interaction arising from use of materials in insect-disease control aspect.

Ent. 12

Maine

Biology and Control of the European Red Mite. To learn (1-3) efficiency of various new materials in large scale spray operations approximating commercial conditions; (2) efficiency of experimental acaricides under conditions in state for possible inclusion in future control recommendations; (3) effect, if any, the inclusion of more common fungicides have on efficiency of tested acaricides. (4) Continue study on biology and life history of European red mite as found in state.

Ent., Pl. Path. 13

N. Mex.

The Evaluation of Clonal Apple Rootstocks for the Production of Dwarf or Semi-Dwarf Trees and for Resistance to the Woolly Aphid Insect. To (1) compare and evaluate growth, production and other economic characteristics of trees of commercial apple varieties grafted on certain clonally propagated rootstocks; and (2) evaluate rootstocks for resistance of Woolly Apple Aphid.

Hort. 56

Ohio

Factors Influencing the Incidence of Apple Insects and Mites in Different Orchards and the Possible Utilization of these Factors in Control Programs. To (1) study underlying causes for variation in insect and mite prevalence and damage in orchards; and (2) integrate, if possible, into orchard practice that which may be found through the first objective, to supplement and reduce present chemical control programs.

Ent. 22

Utah

Orchard Rootstocks Investigations. To secure better adapted, hardier, higher yielding, longer lived, earlier bearing, disease and insect resistant rootstocks for orchard fruits for Utah conditions.

Hort. 339

Utah

The Control of Mites and Insects on Fruit Trees. Evaluate available miticides in control of mites on fruit trees, learn optimum time and rate of application and their effect on other harmful and beneficial insects in orchards. Fit more effective miticides into well rounded spray program by integration mite control program with best control for other insects. Study habits and distributions of species in State to learn importance of species found on fruit trees.

Ent., Hort. 431

Va.

Breeding New Varieties of Apples Especially Adapted to Conditions in Virginia. (1) Develop new varieties of apples well adapted for commercial production; study types late in season of blooming, resistant to disease and insects. (2) Conduct fundamental work including studies of pollination values and cytological relations of Virginia apple varieties and production of polyploid types of apples.

Hort. 86003

Va.

Susceptibility of Codling Moth to DDT and to a New Nematode Disease. (1) Learn extent of codling moth resistance to DDT in apple orchard in northern Virginia, and the order of such resistance. (2) Compare characteristics of resistant and non-resistant strains. (3) Improve control of resistant strains by insecticides and by disseminating a new nematode disease of the larvae.

Ent. 86005

Va.

Fungicide and Insecticide Compatibilities in Orchard Spraying. To determine (1) fungicidal effectiveness of standard fungicides; (2) pesticidal potency of insecticides and acaricides, (3) phytotoxic character of combinations of these products used in simultaneous combinations; and (4) safety and effectiveness of certain fungicides when used in alternating sequence.

Ent., Pl. Path., Phys. 86020

Va.

DDT Wettable Powder Formulations in Relation to Performance Against the Codling Moth. To (1) learn if current formulations of DDT wettable powder are of equal effectiveness against codling moth; (2) determine what factors or characteristics of a formulation contribute to effective performance against the insect; and (3) formulate DDT wettable powders to improve effectiveness and test them for initial and residual toxicity.

Ent. 86039

C. Stone Fruit Insects

Ark.

Control of Plum Curculio by Reduced Schedules and Spot Applications. To control plum curculio by limiting insecticide applications to the time and place needed.

Ent. 272

Ark.

Biology and Control of the Oriental Fruit Moth. To develop measures for satisfactory control of Oriental fruit moth on peaches, involving a study of the biology of the insect to determine factors favoring its abundance, and evaluating control procedures including biological and ecological factors as well as chemical control.

Ent. 353

Colo.

Insect and Mite Populations and Their Relationship to Virus Transmission in Stone Fruits. (1) Learn relationships of insect and mite populations to virus disease incidence for western Colorado fruit districts. Investigate (2) influence of Eriophyes insidiosus K and W, and other related species, in transmission of peach mosaic virus and study the possible insect or mite vectors of rasp leaf of cherry; (3) influence of biological control and cultural practices in reduction of virus incidence. (4) Develop selective chemical controls which promote populations of beneficial species. (5) Learn means of recognizing viruliferous species in overwintering condition for increasing efficiency of eradication procedures.

Ent. 34

Ga.

A Study of New Insecticides and Fungicides for the Control of Peach Insects and Diseases. To find more effective insecticides and fungicides for the control of peach insects and diseases.

Hort., Pl. Path. 100

Ohio

The Biology and Control of Insect Pests of Stone Fruits. To study life history, seasonal and geographic distribution of insects and related arthropod pests of stone fruits and to develop or improve methods of control; with special emphasis on so-called cat-facing insects, plum curculio, peach leaf miner, and suspected vectors of peach and cherry viruses.

Ent. 18 Coop. ARS

Pa.

The Biology and Control of the Cherry Fruitflies, Rhagoletis Cingulata Loew and R. Fausta O.S. in the Great Lakes Region. To study the influence of environment on populations of the cherry fruitflies, and to evaluate several compounds in comparisons with the new recommended lead arsenate as control agents.

Zool., Ent. 1012

Pa.

Breeding Improved Varieties of Raspberries. To (1) breed improved raspberries having resistance to freezing, disease, and insects, and desirable horticultural characteristics, (2) determine types and extent of virus infection, (3) identify and study insect vectors causing transmission of viruses, and (4) study inheritance of certain characteristics.

Hort., Zool., Ent., Bot. 1094

Pa.

Biology and Control of Insect and Related Pests of Peach. To learn (1) life history of certain insects, (2) effectiveness of certain chemicals as control for pests of economic importance in peach orchards of state.

Zool., Ent., Hort. 1255

S. C.

Control of Borers Attacking Peach Trees. To develop a control program against the peach tree borer, Sanninoidea exitiosa (Say), the lesser peach tree borer, Syntanchedon pictipes (G. and R.), and the shot-hole borer, Scolytus rugulosus (Ratz.), and other species.

Ent. 112

Va.

Life History and Control of the Peach Tree Borer, Sanninoidea Exitiosa (Say) and the Lesser Peach Tree Borer, Syntanchedon Pictipes (G. and R.). To learn (1) life history of lesser peach tree borer; (2) areas of infestation within state; (3) extent of injury caused by peach tree borer and lesser peach tree borer; (4) efficiency and safety to peach trees of various insecticides and combinations of insecticides for peach tree borer and lesser peach tree borer control; (5) correct timing of sprays for lesser peach tree borer control.

Ent. 86085

D. Small Fruit Insects

Ark.

Reduced Spray Schedules to Control Grape Insects. To choose (1) materials effective for more than one insect and obtain a satisfactory control with a relatively small number of spray applications. (2) Insecticides to minimize danger to farmer, consumer, and to beneficial insects.

Ent., Pl. Path. 464

Ark.

Biology and Control of Strawberry Crown Borer. To (1) find a control program which will control crown borer without causing other problems, (2) learn the most effective method of application of insecticide as well as proper timing.

Ent. 465

Calif.

The Nature of and Predisposing Factors for "Wetness" of Table Grapes and the Relationship of this Condition to Market Quality. To (1) specify what wetness is, (2) determine significance of moisture of condensation in relation to wetness, (3) determine role of condensed moisture in predisposing the fruit to decay, (4) determine significance of berry juice in relation to wetness, (5) evaluate relationship of rough handling to berry injury in terms of amount of wetness, (6) determine relationship between wetness from injury and decay incidence, (7) determine if use of excessive amounts of SO₂ for fumigation predisposes fruit to wetness, (8) determine significance of microscopic injuries such as insect punctures in relation to wetness, (9) learn changes in permeability of the skin to juice during stages of senescence of fruit during storage, (10) learn if wetness is correlated with maturity of fruit when harvested, and (11) learn influence of different degrees and types of wetness upon market quality of fruit as indicated by wholesale and retail prices.

Agr. Econ., Pl. Path. ES 456 Coop. ARS

Calif.

Control of the Grape Bud Mite by Chemical and Cultural Methods. Devise a method of control that can be used by commercial grape growers.

Vitic., Ent. 1710

Calif.

Grape Planting Stock Investigations. Investigate (1) methods of producing own-rooted vines; (2) methods of establishing vines on resistant stocks; (3) mechanization of field grafting and improvement in field grafting techniques; (4) treatment of rooted and non-rooted stock to eradicate soil pests -- phylloxera and nematodes -- prior to distribution or planting.

Vitic. 1737

Ky.

The Biology and Control of Insects and Mites Attacking Strawberries. (1) Learn effectiveness and safeness of soil insecticides. (2) Study biology of insects and mites attacking first year plantings and learn importance of their control during non-bearing year. (3) Study biology of insects and mites attacking strawberries on their bearing year and learn effectiveness of acaricide and insecticides on these pests.

Ent., Bot. 464

Maine

Insects Affecting the Blueberry. (1) Strengthen insect pest control program and attempt to find formulations more stable under adverse weather conditions. (2) Find adequate control measures for late blueberry maggot in fruit destined for frozen or fresh fruit market. (3) Amplify data obtained on pollination, and learn if intensive pollination would result in a stand of undersized berries. (4) Continue biological studies on destructive pests of blueberries.

Ent., Hort., Chem. 11

Mass.

Injurious and Beneficial Insects of the Cranberry.

To (1) study biological relations of cranberry pests, especially parasitism; (2) clarify some scale insect relations now obscure; (3) further test newer insecticides as presented; (4) study cranberry fruitworm life history as related to blueberry and cranberry infestations; and (5) study the possibility of controlling cranberry fruitworm by killing adults compared with present methods of control based on killing of small worms.

Cran. 119

Mont.

The Ecology and Control of the Black Cherry Fruit Fly

Rhagoletis Fausta in Western Montana. To (1) determine distribution of fruit fly in fruit-producing areas of Western Montana; (2) determine which fruits other than cherries serve as hosts for black cherry fruit fly and which might function as reservoirs for reinfestation; (3) study life processes in relation to environment to discover controllable limiting factors in either physical or chemical environment; and (4) continue work in progress on developing an acceptable insecticidal control method.

Hort. 946

N. H.

The Development, Improvement and Maintenance of

Blueberry Fields. To determine (1) reliable procedures for developing and maintaining blueberry plants on abandoned farm lands and other available areas; (2) optimum cultural practices particularly fertilizer requirements, weed control, and the control of insects and diseases; (3) the ecological factors significantly associated with successful blueberry production; and (4) to create improved stands through selection and breeding.

Hort. 56

N. J.

Blueberry Insect Investigations. To study 8 major insect pests and a much larger number of minor pests, any one of which could become a serious problem. These include: sharp-nosed leafhopper, Scaphytopius magdalensis, Prov.; virus-like-conditions of blueberries that may be insect transmitted; cherry fruitworm, Grapholitha packardi, Zeller; Plum Curculio, Conotrachelus nenuphar, Herbst.; blueberry maggot, Rhagoletis pomonella, Walsh; Putnam scale, Aspidiota ancylos, and crown girdler, unknown sp.

Ent. 202 Coop. ARS

N. Y.
(State)

Biology and Control of the Grape Phylloxera.

(1) Obtain information on biology and habits of pest under conditions in Chautauqua grape belt. (2) Learn if insect causes economic damage to Concord grapes. (3) Develop chemical control.

Ent. 6

Oreg.

Diseases of Small Fruits. 1. Strawberry Viruses. To (1) determine possible importance of highly resistant varieties such as Rockhill, as natural reservoirs of inoculum for susceptible varieties; (2) determine factors influencing the expression or masking of virus symptoms; (3) determine response of strawberry species (Fragaria bracteata, F. ovalis, F. cuneifolia, F. chiloensis, F. vesca), and other closely related native herbaceous plants (Potentilla gracilis, P. anserina, P. glandulosa, Horkelia congesta, Geum macrophyllum, etc.) when inoculated with strawberry viruses, and their importance as reservoirs of inoculum: also certain other species (Rosa nutkana, Rubus leucodermis, R. lacinatus, R. idaeus, R. sp., Medicago sativa, etc.); (4) determine possibility of inactivation of strawberry viruses by means of chemical therapeutics; (5) test varieties and selections carrying different components of virus complex for vigor, productiveness and longevity under field conditions; (6) develop and maintain virus-free foundation stocks of chief commercial varieties and unreleased USDA hybrids under vector-proof conditions; and (7) determine possibility of preventing or slowing spread of strawberry viruses by controlling insect vector, Capitophorus fragaefolii (ck.)

Bot., Ent., Pl. Path. 137-1 Coop. ARS

Pa.

Insect Pests of Grapes. To devise methods and evaluate materials for chemical control of grape berry moth, grape phylloxera and other grape pests.

Ent., Hort. 1251

P. R.

Control of Coffee Insect Pests. To determine (1) most effective and economic insecticides for control of coffee leaf miner Leucoptera coffeella Guerin-Menneville and the hormiguilla Myrmelachista ambigua var ramulorum Wheeler; and (2) best spraying schedule, and rates, and methods for application of insecticide that prove to be of value in control of the leaf miner and hormiguilla.

Ent. 72 Coop. ARS

Tenn.

A Study of the Life History and Control of the Strawberry Leaf Roller, Ancylis Comptana, and Some Related Aspects of Strawberry Insect Control. (1) Make a study of the life history and control of the strawberry leaf roller under Tennessee conditions. (2) Learn if possible factors leading to outbreaks of the leaf roller. (3) Investigate the parasite complex.

Ent. 101

E. Sub-Tropical Fruit Insects

Calif.

Control of Olive Scale in Northern California. (1) To perfect a chemical control method using a less hazardous material than parathion and to obtain data for registration of material. (2) Learn relations of spray coverage to effectiveness of control and possibility that heavy metal chelates of Zn, Fe, and Mn may retard development of olive scale, and aid in working out a combination or transition from chemical to biological control when the biological control becomes sufficiently developed.

Ent. 1204

Calif.

Laboratory and Field Studies of Petroleum Oils for Insecticide Use. To provide specifications for spray oils better suited for use in control of insect and mite pests of citrus than oils currently available by ascertaining properties of petroleum type hydrocarbons related (a) to maximum insecticide efficiency against insect and mite pests of citrus, and (b) to minimum deleterious effects on the physiological processes of citrus.

Ent. 1229

Calif.

Biological Control of Red, Yellow, Purple, and Other Diaspine Scales on Citrus, Avocado, Walnut and Ornamentals.
To (1) search for, introduce, rear in quarantine and study biologically and natural enemies new to California; (2) colonize, recover, and evaluate effectiveness of introduced natural enemies; (3) evaluate effectiveness of already established natural enemies and develop methods to increase efficiency, if needed; and (4) evaluate effect of sprays, dusts, and fumigants on natural enemy-host population interactions in field and develop methods to reduce to a minimum the adversity of such materials.

Biol. Control., Ent. 1493

Calif.

Evaluation and Ways of Implementing Biological Control of Olive Scale. (1) Fully evaluate inherent potentials of biological control of olive scale by Aphytis maculicornis, or other promising species. (2) Study the environmental and cultural complex of associated factors, to augment degree of biological control and to replace chemical control by biological methods when possible.

Biol. Control. 1750

Calif.

The Systematics and Biology of Scale Insects. Study taxonomic aspects of certain groups of scale insects (Homoptera - Coccoidea): a revision of Nilotaspis Ferris and allied genera; a study of scale insect species identified in connection with the 1951 exploration for parasites of the olive parlatoria scale, Parlatoria oleae (Colvee).

Ent., Parasitol. 1775

Hawaii

The Biology and Ecology of Dacus Dorsalis, D. Cucurbitae, and Ceratitis Capitata in the Hawaiian Islands and of other Trypetidae Should They Become Established There. To learn the range and abundance of the species, a program of trapping adult flies throughout the Territory will be carried out, as well as a program of rearing flies from fruit, both bait and naturally occurring fruit. To determine seasonal variation in abundance the above program will be continued and field observations made to obtain data on activities throughout the year. To determine the hosts of each species, field and lab observations on host fruit and host preference of each species will be made. And to study the relationship of the flies to each other and to other species, field observations and lab examination will be made, giving special attention to parasites and predators.

Ent. 960-3

Hawaii

Investigations of the Establishment and Spread of Parasites, Predators, and Diseases Introduced into Hawaii and their Importance in Reducing the Abundance of and Damage by Dacus Dorsalis, D. Cucurbitae and Ceratitis Capitata. To determine (1) whether and when introduced parasites, predators and diseases on Dacus corsalis, D. curcurbitae and Ceratitis capitata become established after they are released on the different islands; (2) rate of spread of introduced beneficial enemies; (3) whether enemies bring about economic control under all widely different ecological conditions; (4) optimum ecological conditions for different enemies introduced so that cultural practices may be used that aid enemies; and (5) whether further search is needed for enemies especially adapted to certain ecological conditions under which recently introduced enemies may not thrive.

Ent. 960-5 Coop. ARS

Hawaii

Chemical Control of Fruit Flies in Hawaii.
1. Laboratory Studies on Toxicity of Insecticides to Fruit Flies. 2. Field Studies. To determine the toxicity of chemicals to fruit flies, and (2) develop satisfactory methods for controlling fruit flies on fruits and vegetables.

Ent. 961 1 and 2

P. R.

Control of Insects Attacking the West Indian Cherry, (Malpighia Punicifolia L.) in Puerto Rico. To (1) determine effectiveness of insecticides in control of insects of foliage and fruit of West Indian cherry; (2) make life-history studies of most important insect pests; and (3) find out best spraying program for insect control.

Ent., Agron., Hort. 71

II. NUT INSECTS

Miss.

Insecticide Tests for the Control of the Hickory Shuckworm Laspeyresia Caryana (Fitch) on Pecans. To test the effectiveness of EPN for the control of the hickory shuckworm under Mississippi conditions.

Ent. HH-11

III. VEGETABLE INSECTS

A. General

Alaska

Root Maggots in Alaska. To (1) investigate root maggot incidence, wild host plants, dissemination and crop plant damage under various environmental conditions in field and laboratory, and to learn an effective means of control for turnip, seed-corn, onion, and other root maggot species which are, or may become, serious hazards.

Hort., Soils AL-1-7-1(A) 45 Coop. ARS

Del.

Controls for Vegetable Insects. Improve control of vegetable insects by use of resistant varieties, new toxicants, and better methods of insecticide application.

Ent. 5-E

Idaho

Insect Pollination of Vegetable Seed Crops. Learn (1) insects associated with pollination of vegetable seed crops and their relative abundance; (2) effectiveness, in terms of seed yields, of the more important pollinating insects and factors responsible for effectiveness; (3) how pollinating species can be increased in vegetable seed fields.

Ent. 336

La.

Biology and Control of Insects Affecting Vegetable and Fruit Crops. (1) Obtain more complete information on biology of insects affecting vegetable and fruit crops. (2) Evaluate damage caused by various species. (3) Develop control measures allowing for production of vegetable and fruit crops free from insect damage and excessive insecticide residues. (4) Investigate possibilities of using cultural practices, time of planting methods and virus diseases of insects as further means of control.

Ent. 406

Maine

Biology and Control of Vegetable Insect Pests with Special Reference to Soil Inhabiting Species. To obtain better and more practical control of insects injurious to Maine vegetables.

Ent., Chem., Hort. 37

Md.

Studies on the Efficiency of Fixed Boom Low Volume Sprayers. To (1) determine minimum amount of spray needed to secure adequate coverage and satisfactory control of insects on vegetable and canning crops; (2) develop efficient types of spray booms suitable for different row and broadcast crops; and (3) develop versatile equipment that may be used on several crops, particularly the adaptation of corn spraying equipment to spraying of peas and beans.

Agr. Engin., Ent. H-46-d

Mass.

Breeding Sweet Corn, Peppers and Field Tomatoes for Massachusetts. Early types and varieties of sweet corn, peppers and field tomatoes will be developed that are adapted to the climatic conditions found in Massachusetts as well as sorts that may be resistant or immune to certain insects and diseases that prevail there.

Hort. 86

Minn.

Ecology, Life History and Control of Insects Attacking Vegetables in Minnesota. To (1) determine most important injurious insects of vegetables in Minnesota from year to year; and (2) develop more effective methods of controlling vegetable and potato insects through observations and experiments of life histories, ecology, varietal resistance, and use of insecticides.

Ent., Zool. 1705

N. H.

Breeding Better Vegetables for New Hampshire. To develop new varieties of vegetables having superior qualities in one or more of these respects: Better adapted to the climate, higher in nutritive value, more productive, better appearance, and disease and insect resistant.

Agr. & Bot., Chem., Hort. 54

N. J.

The Relationship of Insects to Vegetable Diseases and their Control. (1) Investigate the role that certain insects play in the transmission of diseases in vegetable crops in New Jersey. (2) Determine which methods of control and what insecticides can be used against these pests.

Ent. 214

N. J.

The Use of Systemic Insecticides on Vegetable Crops. Determine: insecticidal efficiency, phytotoxicity, effects on quality, and residues.

Ent. 215

N. Y.
(State)

Insect Vectors Involved in the Transmission of Diseases of Vegetable Canning Crops. (1) Identify insect vectors of certain virus and bacterial diseases of vegetable crops. Study (2) method by which insects transmit specific diseases; (3) ecology of insect vector involved in relation to hosts in which pathogen over-winters. (4) Control insect-transmitted diseases of vegetables through utilization of a knowledge of insect vector and how it serves in etiology of disease.

Ent. 5

N. C.

Biology and Control of Insects and Mites Affecting Vegetable Crops. To (1) develop better methods of controlling vegetable pests; (2) study effects of insecticides on injurious and beneficial insects and on crop yield and quality; (3) study life histories and ecology of vegetable pests; (4) determine importance of various species of insects and mites affecting vegetables in the state and ascertain their geographical and seasonal distribution; and (5) find out the insect vectors of plant diseases.

Ent. 45 Coop. ARS

Ohio

Control of Soil-Inhabiting Nematodes, Fungi, Bacteria and Insects Affecting Vegetable Crops. To (1) determine and classify soil-inhabiting organisms responsible for economic loss on vegetable crops growing in Ohio soils, (2) devise means of controlling most destructive organisms, and (3) design and test equipment and application techniques for use in applying various liquid and dry formulations in the control of soil-inhabiting pest complex on vegetables.

Bot., Ent., Agr. Engin. 131 Coop. ARS

Okla.

Ecology, Seasonal Development and Control of Insect Pests of Spinach and Related Crops. To (1) study biology and seasonal abundance of Hylemya cilicrura, Heliothis sp., Myzus persical, Rhopalosiphum pseudobrassicae, Trichoplusia ni Plutella maculipennis, etc. damaging greens crops; (2) test insecticides for control; (3) determine amount of residual insecticide on fresh, unwashed greens at different periods after treatment, and (4) determine effect of various food preparatory processes upon depreciation of residues on crops.

Agr. Chem., Hort. 594

Oreg.

The Symphylid, Scutigerella Immaculata Newport, Its Biology and Control on Truck, Nursery, and Greenhouse Crops. To study effects of (1) different methods of soil tillage on soil pests, (2) soil fumigants on pests, and (3) combinations of tillage and soil fumigants on symphylid and other pests.

Ent. 109-1

W. Va.

Testing New Fungicides and Insecticides for Value as Pesticides on Small Fruit and Vegetable Crops. To (1) compare effectiveness of new fungicides and insecticides with that of older pesticides in control of diseases and insects prevalent on small fruit and vegetable crops in West Virginia; and (2) study value of insecticide-fungicide combinations as general purpose pesticides on above crops.

Pl. Path., Bact., Ent. 32

B. Cabbage and Related Crop Insects

Miss.

Cabbage Insect Control. (1) Test for effectiveness of insecticides against cabbage insects in commercial areas of state. (2) Develop insecticide applications that will control pest of cabbage and will conform to residue tolerance limits of Federal and State Pesticide Regulations. (3) Learn if cabbage worms are resistant to DDT.

Zool., Ent. HH-8, HZ-2

C. Cucumbers and Related Crop Insects

Ga.

Breeding High Quality Market Type Cantaloupes Resistant to Disease, Insects, and Adverse Physical Environment. To breed a cantaloupe variety with good edible and shipping qualities that has enough resistance to all important diseases and insects to be profitably produced in any part of Georgia without the expence of spraying, irrigation, and extremely heavy fertilization.

Pl. Path. 99

Ky.

Control of Insect Pests Affecting Cucurbits. To develop new control measures for the striped cucumber beetle, (Diabrotica vittata (F.)), melon aphid (Aphis gossypii) (Glov.), squash bug (Anasa tristis) (Deg.), squash borer (Melittia cucurbitae (Harr.)), pickle worm (Diaphania nitidalia (Stoll)), and melonworm (Diaphanis hyalinata (L.)).
Ent., Hort., Bot. 455

Mass.

Control of Insects on Cucurbits in Relation to Yield and Quality. To develop an effective, safe, economical program of pest control on cucurbits which will permit production of large yield of pest-free fruit without impairing its taste, texture, appearance, keeping or processing qualities.

Ent. 55

D. Lettuce and Other Salad Crop and Greens Insects

N. Y.
(Cornell)

Investigations of the Control of the Six-Spotted Leafhopper, the Vector of Aster Yellows in Lettuce. To determine the possibilities of controlling the yellows disease of lettuce through measures aimed at control of the leafhopper vector.

Ent., Veg. Crops 93

E. Onion and Other Root Crop Insects

Mass.

Biology and Control of Carrot Weevil Attacking Carrots. Develop practical methods of control by culture and use of insecticides for carrot weevil in carrots and parsnips.

Ent. 151

N. Mex.

Development of Hybrid Varieties of Onions of the Grano Type. To develop one or more first-generation hybrids that are superior to White Grano and Early Grano in the following: 1. yield; 2. uniform early maturity; 3. uniformity of size, shape and color; 4. resistance to bolting; 5. resistance to pink root disease; and 6. resistance to thrips injury.

Hort. 6

N. Y.
(Cornell) Studies of Insect Pests of the Onion with Special References to Onion Maggot and Onion Thrips. To give attention to insect problems of onions as need necessitates.
Ent., Veg. Crops, Pl. Path. 94 Coop. FES

Ohio Evaluating Insect Resistance in Varieties and Strains of Onion. To (1) segregate varieties and strains of onion which are less susceptible to onion thrips and to onion maggot; and (2) develop a variety or varieties of onion which combine insect resistance with desirable horticultural qualities.
Ent. 7 Coop. ARS

F. Pea and Bean Insects

Ark. Control of Weevil and Curculio Injury to Cowpeas.
Develop measures for prevention of damage to cowpeas by cowpea weevil and the cowpea curculio.
Ent., Hort. 271

Ga. Improvement of Type and Disease and Insect Resistance in Southern Peas (*Vigna Sinensis*) Through Breeding. To develop productive varieties of Southern peas with improved qualities for processing and fresh market and to incorporate into these a resistance to Fusarium wilt, powdery mildew, bacterial blight, and nematodes. A total of 355 lots of seed of the genus Vigna has been collected, including 280 foreign introductions and 75 varieties of Vigna sinensis. These will be observed and classified as to mature seed characteristics. Greenhouse and field studies will be conducted to determine adaptability, productivity and insect and disease resistance. Using selected plants that are desirable as parental material, it is planned by hybridization and selection, to develop varieties with the characteristics stated above. Selected lines that are considered worthy of extensive testing will be included in trials at the S. E. Georgia Branch Experiment Station, Midville, Georgia, in cooperation with the Horticulturist of the Branch Stations.
Hort. 92

Hawaii

Control of Insects of Truck Crops. 2. Beans. To (1) determine biology and habits of insects of beans; (2) determine susceptibility of insects involved to most promising insecticides; (3) determine phytotoxic effects of different insecticides on beans; and (4) develop effective methods for controlling different pests involved.

Ent. 954.2

Md.

Chemical Control of Bean Insects: Evaluation of Commercial Treatments and Investigations of New Insecticides. To (1) evaluate present recommendations for chemical control of bean insects under commercial conditions; (2) determine effectiveness of new insecticides for bean insect control in small plot tests; and (3) obtain information on effectiveness of earworm control on lima beans particularly regarding dosage and timing of treatments.

Ent., Agr. Engin., Hort. H-29-L

Tenn.

Inheritance in Garden Beans with Reference to Resistance to Mexican Bean Beetle and Other Insects, Nematodes, Diseases, Southern Adaptation and Commercial Quality. To study possibilities of combining species, kinds and varieties of beans in order to develop Southern garden beans.

Hort. 121

Wash.

Insect Transmission of Bean Virus Diseases. To learn (1) what insects are responsible for field transmission of bean virus diseases; (2) seasonal cycles, field distribution, and alternate hosts of those insects transmitting the diseases; (3) effect of insect control on field spread of virus diseases of beans; and (4) native and cultivated plants which serve as reservoirs of bean virus diseases.

Ent. 1221 Coop. ARS

G. Potato Insects

Colo.

Control of Insects Transmitting Potato Viruses in Colorado. Learn (1) what insecticides give best control of aphids and leafhoppers; (2) most effective and economical rates of application; (3) if systemic insecticides will give protection to the potatoes late in growing season when there is a build up of aphid and leafhopper population.

Ent. 36

Ga.

Sweet Potato Insects and Their Control. Learn insect pests responsible for damage to foliage and roots of sweet potato and develop methods of control.

Ent. 68 Coop. ARS

Ga.

A Study of the Relationship of Insects to the Transmission of a New Sweet Potato Mosaic Virus. Learn (1) if an insect is the vector of the causative virus of sweet potato mosaic; (2) if so, when it occurs on plantings and at what period transmission occurs. (3) Establish a control measure for the vector.

Ent. 221 Coop. ARS

La.

Sweet Potato Weevil Studies in Field and Storage and of Soil and Foliage Insects Affecting Sweet Potato Vines and Roots. (1) Develop economic insecticide control measures applicable to soil pests or foliage feeding insects. (2) Study any resistance of potato insects to commonly used chlorinated compounds and test materials having a different mode of action. (3) Continue studies on insecticides used to control potato weevil in storage. (4) Test potato varieties for possible resistance to insect damage. (5) Study biology and ecology of potato flea beetle and other root and foliage feeding forms. (6) Learn residue values of insecticides on or in edible product. (7) Develop better insecticide application methods.

Ent., Hort. 447

La.

A Study of Insect Vectors of Internal Cork and of Foliage Feeding Insects of Sweet Potato. Learn vector(s), responsible for transmission of internal cork of sweet potato. Study biology and ecology of vector to learn methods of attack for its control. Develop control measures for vector. Learn effect of foliage feeding insects on yield and quality.

Ent. 869

Maine

Wireworm Control in Relation to Modern Production Methods. To obtain information on control of wireworms in potato land consistent with modern mechanized agriculture, especial attention being given to soil insecticides and fumigants lending themselves to mechanical application.

Ent. 71

Maine

Effects of Various Insecticides on Aphids Infecting Potatoes and on Their Parasites and Predators. (1) To learn aphidical value of chemicals in current use such as chlorthion, DDT, Diazinon, Guthion, Rotenone, Systox, and Toxaphene, and (2) their secondary effects on the natural enemies of the aphids.

Ent. 101 Coop. ARS

Maine

Entomogenous Fungi for Aphid Control. To learn (1) conditions necessary for the successful establishment of entomogenous fungi in the field, and the optimum conditions for spread; (2) influence of fungicides on establishment and spread.

Ent. 102 Coop. ARS

Nebr.

Control of Potato Insect Pests. 1. Potato Flea Beetles. To (1) develop more effective, practical and economical methods of preventing losses caused by potato insects in Nebraska; (2) make biological and ecological studies of flea beetles and other important potato insects; (3) investigate certain fundamental biological and physiological aspects of relationship of insects to potato plants with especial reference to development of resistant varieties.

Ent. 223-1

N. Y.
(Cornell)

Studies on the Control of Insects Attacking Potatoes.
1. Control of Insects Attacking Potato Foliage. To study insect losses from potato foliage pests.

Ent., Veg. Crops 97-1

N. Y.
(Cornell)

Studies on the Control of Insects Attacking Potatoes.
2. Control of Insects Attacking Potato Tubers. To determine practical methods for preventing wireworm damage.

Ent. 97-2

N. Y.
(Cornell)

Studies on the Control of Insects Attacking Potatoes.
4. Control of Insect Vectors of Potato Virus Diseases. To apply control measures for insect vectors of potato virus diseases and determine the value in terms of disease free tubers.

Ent., Pl. Path. 97-4

N. C.

Irish Potato Breeding. To (1) develop varieties which are early maturing, productive, resistant to major diseases and insects, and superior in carrying and in market qualities; (2) establish and maintain special breeding lines carrying genetic characters that are important in southern region; and (3) study inheritance of a. resistance to scab, and to southern bacterial wilt, b. tuber color, and c. time of maturity.

Hort. 81 Coop. ARS

N.C.

Investigations on the Field Diseases of Sweet Potatoes. To (1) investigate the role of nematodes in sweet potato production and use of nematocides for their control, (2) survey horticultural and agronomic crops for strains of Fusarium oxysporum that are infectious to sweet potato, (3) establish value of vine cuttings in controlling black rot and scurf of sweet potatoes, and role of soil organic matter on longevity of the respective pathogens, Endocomidiophora fimbriata and Monilochaetes infuscans, (4) investigate mode of transmission, host range, diagnosis and physiology of internal cork disease and other viruses, and (5) study life cycle and economic importance of Fusarium surface rot.

Pl. Path. 91

N. Dak.

Rates and Methods of Applications of Insecticides to Potatoes. To (1) determine advisability of installing low pressure and low gallonage equipment on high pressure sprayers and transforming existing equipment into dual purpose sprayers; (2) determine controversial issue on 3% vs. 5% DDT dusts on larger plots; (3) continue search for residual aphicide; and (4) determine if newer and cheaper 75% DDT wettable powders can supplant emulsifiable concentrates.

Ent., Pl. Path. 5-1

Ohio

Evaluating Insect Resistance in Varieties and Strains of Potato. To (1) study behavior of potato pests (with major emphasis on potato leafhopper and potato flea beetle, and secondary consideration on potato aphids, Colorado potato beetle, blister beetles, and tarnished potato bugs), with special reference to strains; and (2) develop a variety or varieties of potato which combine insect resistance with desirable horticultural qualities.

Ent. 23 Coop. ARS

Tenn.

Studies on Soil Insecticides with Special Reference to the Control of the Elongate Flea Beetle, Systema Elongata.

(1) Develop a method of soil treatment to destroy larvae which are cause of injury to sweet potatoes. (2) Learn effects of such soil treatment as are developed on plant growth, yield, and off flavors. (3) Study insecticide-fertilizer mixtures and their compatibility. (4) Find best and most economical dosage of insecticide per acre. (5) Learn any possible off flavors that insecticides may impart to sweet potatoes.

Ent. 99

W. Va.

Improvement of Potato Varieties for West Virginia. To (1) select promising breeding stocks of improved physiological and morphological characteristics having greater resistance to disease, insect injury, and unfavorable environmental factors commonly found in West Virginia; and (2) to determine the nature, variability, and methods of inheritance of resistance in potato varieties to diseases and to injuries by insects and environmental factors.

Hort., Pl. Path. 4

H. Sweet Corn Insects

Md.

Chemical Control of Insect Pests of Sweet Corn. To improve present insecticidal methods of control of insects attacking sweet corn or to develop new and more efficient methods.

Ent. H-29-m Coop. ARS

N. Y.
(Cornell)

Control of the Corn Earworm Attacking Sweet Corn in Eastern New York. (1) Develop methods and materials of greater value than those in current use. (2) Determine levels of population potential for each season and relate information to county agents and growers. (3) Investigate possibility of developing so-called "resistant hybrids" for growing conditions in state. (4) Study all conditions that appear antagonistic to earworm population development, insect enemies, and diseases.

Ent. 171

I. Tomatoes and Related Crop Insects

Ind.

Insect and Related Problems in Food Processing Plants, with Special Reference to Tomato Canneries. (1) Learn species of insects constituting problems in and about plants, and factors contributing to intensity of occurrence. (2) Develop improved methods of control measures for protection of foods from harvest through to finished product. (3) Study methods of reducing residue hazards resulting from application of insecticides. (4) Discover improved methods for control of obnoxious insects developing in waste products of processing.

Hort., Ent. 929

Mo.

Commercial Culture of Truck Crops and Greenhouse Vegetables. e. Cultural Practices for the Processing Tomato Crop in Southwest Missouri. To (1) conduct a tomato improvement project similar to that of last year in 4 additional counties; (2) concentrate experimental plots at canning centers on several different soil types; (3) field test several new insecticides and fungicides; and (4) study graded quality with more emphasis than in the past.

Hort. 121-e

Ohio

Disease and Insect Resistance in the Tomato: A Breeding Project. To (1) develop varieties of tomatoes, resistant to Fusarium wilt, leaf mold, mosaic, and Septoria and Alternaria leaf spots by combining genes for resistance in wild species with genes for desirable qualities in domestic species; (2) study fungi causing diseases from standpoint of physiologic races and their distribution; (3) isolate differential accessions for identification of physiologic races of above disease producing organisms; (4) evaluate developed accessions for resistance to insects which attack glasshouse- and field-grown tomatoes; and (5) study nature of resistance to disease to determine loci on chromosomes of the genes which govern resistance and to conduct embryological studies to determine cause, nature, and degree of incompatibility in interspecific hybrids within genus *Lycopersicon*.

Bot. 37

Wash.

Vegetable Variety Investigations and Breeding of Major Truck Crops Adaptable to Washington Growing Conditions (Greenhouse Tomatoes). To (1) develop by breeding greenhouse tomatoes and selecting new varieties of vegetables that are suitable in yield and quality for fresh use and processing purposes as well as being adapted to one or more climatic areas of Washington; (2) test new varieties and strains in the important producing areas of Washington, including Columbia Basin; (3) obtain information on quality as related to climatic conditions as well as disease and insect resistance; and (4) conduct freezing and canning tests of new strains with cooperation of Fruit and Vegetable by-products and pilot labs.

Hort. 1129

W. Va.

Improvement of Tomato Varieties for West Virginia. To (1) select by extensive testing, tomato varieties with resistance to late blight and other diseases, insects of unfavorable environmental factors commonly found in West Virginia; (2) incorporate these resistant characters into high yielding and high quality tomato varieties adapted to the growing conditions of West Virginia by crossing, backcrossing and selection, in both field and greenhouse; (3) determine nature, variability and method of inheritance of resistance to tomato diseases and to injuries by insects and environmental factors; and (4) study pathogens for occurrence of pathogenic races and study any phase of diseases fundamental to program.

Pl. Path., Ent., Hort. 58

LIST OF COMPILATIONS OF FEDERAL-GRANT RESEARCH PROJECTS
AT STATE AGRICULTURAL EXPERIMENT STATIONS

ARS-23-8:	:	
Part :	Subject-Matter Area	Title of Section
Numbers :	:	
1	Agricultural Chemistry	Agricultural Chemistry
2	Agricultural Economics	<ul style="list-style-type: none"> a. Prices, Incomes, & General Studies of Commodities & Industries b. Farm Management c. Land Economics d. Farm Finance & Taxation
3	Agricultural Engineering	<ul style="list-style-type: none"> a. Land & Water Use & Development b. Power Machinery & Equipment c. Farm Structures & Materials
4	Animal Husbandry	<ul style="list-style-type: none"> a. Beef Cattle b. Sheep & Goats c. Swine
5	Dairy Husbandry	Dairy Cattle
6	Dairy Technology	Dairy Technology
7	Entomology & Economic Zoology	<ul style="list-style-type: none"> a. Field Crop Insects b. Fruit, Nut & Vegetable Insects c. Miscellaneous Insects & Economic Zoology d. Insecticides
8	Field Crops	<ul style="list-style-type: none"> a. Cereal Crops b. Oil, Fiber, Tobacco & Sugar Crops
9	Food Science & Technology	<ul style="list-style-type: none"> a. Food Chemistry, Microbiology, Sanitation & Public Health b. Food Engineering, Processing, Product and Process Development, Utilization and Waste Disposal c. Food Quality & Standards, Acceptance, Preference, & Marketing
10	Forage Crops, Pastures & Ranges	Forage Crops, Pastures & Ranges
11	Forestry	Forestry

ARS-23-8:

Part : Subject-Matter Area
Numbers :

: Title of Section
:

12	Fruits & Nuts	Fruits & Nuts
13	Home Economics	<ul style="list-style-type: none">a. Human Nutritionb. Housingc. Clothing & Textilesd. Foods-Consumer Quality & Utilizatione. Household Economics & Management
14	Economics of Marketing	<ul style="list-style-type: none">a. Field Cropsb. Fruits & Vegetablesc. Livestock, Meats & Woold. Dairy Productse. Poultry & Poultry Productsf. Forest Products & Ornamental & Drug Plantsg. Cross-Commodity & Functional Studies
15	Meteorology	Meteorology
16	Ornamental & Drug Plants	Ornamental & Drug Plants
17	Plant Pathology & Bacteriology	<ul style="list-style-type: none">a. Plant Pathology, Botany, & Diseases of Miscellaneous Cropsb. Diseases of Field Cropsc. Diseases of Fruit Cropsd. Diseases of Vegetable Crops
18	Plant Physiology & Nutrition	Plant Physiology & Nutrition
19	Poultry Industry	Poultry Industry
20	Rural Sociology	Rural Life Studies
21	Soils	<ul style="list-style-type: none">a. Soil Chemistry & Microbiologyb. Soil Fertility, Management & Soil-Plant Relationshipsc. Soil Physical Properties, Conservation & Classification
22	Vegetables	<ul style="list-style-type: none">a. Vegetable Cropsb. Potatoes
23	Veterinary Science	Veterinary Science
24	Weeds	Weed Control

